



Artificial intelligence in road traffic accident prediction

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ABSTRACT. The rapid development of AI shows its power and great development potential in practical engineering applications. Critical issues and potential solutions can reduce road traffic accidents and application of AI in road accident prediction. The published use of AI for road accident prediction is reviewed, presented, and represented as the main objective. The methods are collecting article data, quotations, presentation, and representation. The article data collection was obtained from 671 conference and journal articles in 2019-2023, but the suitability of articles that can be used is 69. Quotation produces a grouping of approaches, models, predictions, and benefits. The presentation showed that most approaches used were machine learning, the most used model was random forest, the prediction was mostly about severity, and the most benefit was about number reduction. Representation produces road accidents and related factors into factors in road accident predictions using artificial intelligence, so strategies and anticipation can be made to overcome them to improve road safety. AI in road accident prediction plays an important role in building predictive models with the hope that road accidents can be identified early, risk factors can be reduced, and effective preventive measures can be taken to improve road safety.

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INTRODUCTION

Advanced computer technologies such as big data, Artificial Intelligence (AI), cloud computing, digital twins, and edge computing have been applied in various fields along with advances in digitalization (Lv & Xie, 2021). AI is essential in many real-world applications (Yuan et al., 2021) with inconsistent and affected data (Tonni et al., 2021). AI can offer emergency situational awareness and increase the efficiency of emergency response operations (Barachi et al., 2020). AI presents unprecedented prospects for improving the performance of various industries and companies (Khan et al., 2022). AI can accurately analyze locations based on potential risks (Meocci et al., 2021). Each AI algorithm uses a different model and makes predictions based on features (Kumar et al., 2021).

Actualized AI can improve Intelligent Transportation Systems (ITS) (Lv & Xie, 2021) to monitor and investigate large amounts of data generated in transportation (Shaheen et al., 2020). Safety and emergency systems with an AI approach can provide public security by providing economical and reliable transportation (Gangwani & Gangwani, 2021). Transportation using AI focuses on transportation management (Khan et al., 2022) and accident avoidance (Huamani et al., 2023). Face detection is performed to warn drivers about drowsiness or to avoid road accidents (Kshirsagar et al., 2022). Road accident-prone points are predicted using AI using the spatial grouping and cumulative frequency curve methods (Yuan et al., 2021). AI exploration in facilitating automatic incident detection systems is used to reduce road accidents (Olugbade et al., 2022). Proactive accident

prevention will evaluate the risk of road accidents in real-time using AI (Kim et al., 2021) and is a key aspect of road safety (Tonni et al., 2021). AI enables road accidents to be predicted and prevented (Olayode et al., 2020; Oueida et al., 2022). Investigation of the stability and efficiency of AI techniques for reducing road accidents (Olugbade et al., 2022). With proper implementation, an AI-enabled road accident management system can save millions of lives (Panda et al., 2023).

Road accidents have become more dangerous, the highest cause of death (Kumar et al., 2021), and involve a very relevant economic dimension (Infante et al., 2023). Road accident handling is done by intelligently identifying vehicle speed (Ji et al., 2023), tracking, and penalizing (Franklin & Mohana, 2020). Predicting accidents requires stakeholders to create strategies and anticipate the worst possibilities. These requirements have been widely investigated using several technologies and approaches. AI is important in answering these needs because of its reliability, speed, and high accuracy. Identifying and reviewing the use of AI, which is still lacking, is an obstacle in developing AI to predict road accidents. Representation of road accident predictions using AI is an achievable goal. Representations are obtained based on road accident presentations from articles selected and collected first. The resulting presentations and representations can be the basis for developing and utilizing AI in predicting road accidents so that it can support strategies and anticipation to achieve high road safety.

METHODS

The stages carried out include the collection of article data, quotation, presentation, and representation (Figure 1). Collecting article data is the stage of collecting conference and journal articles published in 2019-2023 with the keyword "road accident prediction using artificial intelligence" via the Mendeley website (<https://www.mendeley.com/search/>). Sorting and selecting articles based on keywords corresponding to the title and abstract but not for articles indicated as fake or unclear. 3 Authors act as reviewers who review and discuss appropriate and inappropriate articles. Suitable articles include approaches to using AI, using AI models, types of road accident predictions, and the benefits of road accident predictions. Collecting and storing appropriate articles is the result of the collection of article data stage.

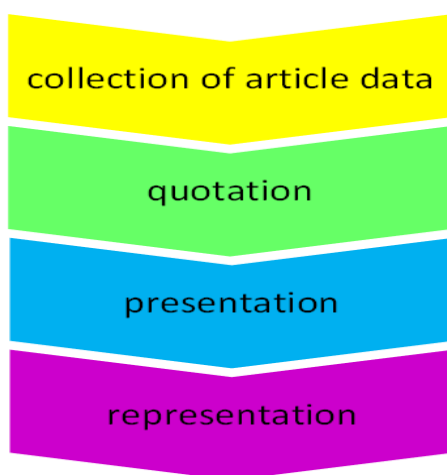


Figure 1. Research stages

Quotation is the next stage, providing a quote for each article. The four quotes embedded in each article are approach, model, prediction, and benefit. Each type of quote is studied, explored, researched, and searched throughout the article. The results achieved at the quotation stage are a quotation map for articles about road accident predictions using artificial intelligence containing

quotes. Presentation is carried out by presenting the data from the quotation stage. The data presented includes the distribution of each type of quotation produced. The results that must be obtained are the presentation of artificial intelligence used to predict road accidents based on quotations: approach, model, prediction, and benefits. Representation results are obtained based on a presentation describing AI's role in road accident prediction. The description of road accident predictions is reflected in aspects that surround or are connected so that the predictions can support the goals to be achieved. The results of the depiction can be used as a basis for developing future road accident predictions using AI.

RESULTS AND DISCUSSION

The concept of positive feedback cycles and continuous improvement in AI systems is called the Artificial Intelligence (AI) Flywheel. The flywheel inspired the concept, which is about a mechanism that stores rotational energy and builds momentum as it spins faster. The concept of a flywheel in the context of AI describes a feedback loop that accelerates the capabilities and benefits of AI over time. AI flywheel chooses the right problem, data collection and preprocessing, model construction, model deployment, and continuous monitoring.

The right problem involves selecting the most relevant and impactful problems using AI techniques. Organizations can ensure that AI initiatives have a meaningful impact, generate valuable insights, and contribute to the overall success of the AI flywheel by selecting the right issues.

Collection and processing involves gathering relevant, high-quality data and preparing it for use in developing AI models. Collecting and processing the right data in an AI flywheel is important to ensure that the developed AI model can access quality and well-structured data. Good data is an important foundation for producing accurate, effective, and reliable AI models.

Model construction involves developing and training an AI model that will be used to make predictions, make decisions, or solve the problem you want to solve. The trained AI model can be used in practical implementations to make predictions or solve the intended problem after complete model construction. Model construction is a central stage in AI flywheels that enhances AI capabilities and the positive feedback cycle.

The AI model that has been constructed and trained will be implemented in a production environment or a real application in the deployment model. The use of ready-to-engage AI models to make predictions, make decisions, or solve problems you want to solve. The deployment model allows AI models to be developed to provide real benefits and provide solutions to the problems you want to solve. An AI model that is implemented effectively in a production environment can continuously evolve and generate sustainable benefits.

Continuous monitoring involves monitoring and evaluating the performance of AI models that have been implemented in production environments. Continuous monitoring enables early detection of problems, improvement of performance, and taking necessary actions to maintain the reliability and effectiveness of AI models. Continuous monitoring ensures that the AI model performs well, is relevant, and provides the expected benefits. Continuous monitoring, improvements, and adjustments can be made proactively, driving the continuity and success of AI implementation. The AI flywheel concept emphasizes the importance of continuous learning, feedback, and iteration to drive AI progress. If the system gains momentum and capability, it can positively impact health, finance, transportation, and many more (Figure 2).

The road accident prediction development and adjustment cycle is based on the AI flywheel concept. The demand for road accident predictions using AI will continue to grow and must be answered. The developments carried out can be searched for and explored from published articles. The number of articles collected was 671 conference and journal articles published in 2019-2023, but only 69 articles

were suitable and usable. The 69 articles were obtained from screening road accident prediction models that use AI. The article's results are given a quotation consisting of approach, model, prediction, and benefits (Table 1).

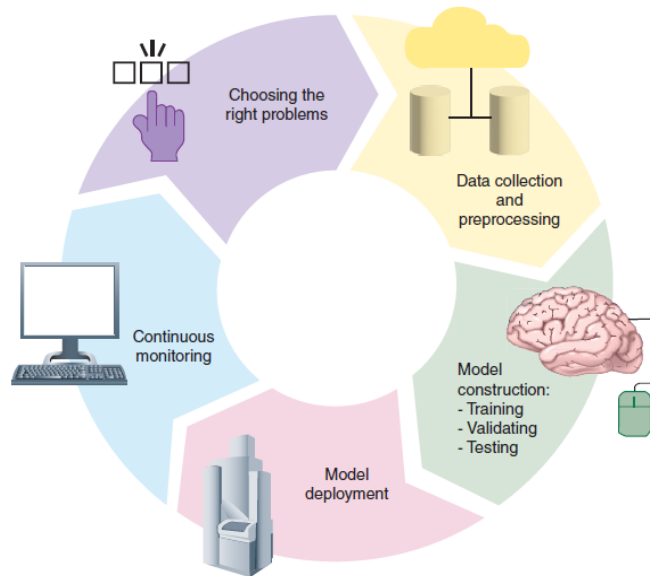


Figure 2. Artificial intelligence flywheel (Farina et al., 2022).

Table 1. Article quotation

Approach	Model	Prediction	Benefit
1. Deep learning (Alrajhi & Kamel, 2019; Behura & Behura, 2020; Gutierrez-Osorio & Pedraza, 2020; N & Punithavalli, 2020; Ning et al., 2022; Pachaivannan et al., 2020; Shaik et al., 2021; Singh et al., 2020)	1. Adaptive Boosting (AdaBoost) (Ballamudi, 2019; Bokaba et al., 2022; Dabhade, 2020)	1. Accuracy(Prakash & V, 2022; Wu & Wang, 2020)	1. Accurate Decision(Augustine & Shukla, 2022; Bahiru et al., 2023; Dabhade, 2020; Guo et al., 2022; Lu et al., 2022; Paul et al., 2020; Prakash & V, 2022; Venkat et al., 2020)
	2. Apriori (N & Punithavalli, 2019)	2. Architecture(Lazar & Jarir, 2022)	2. Comparison of Performance(Augustine & Shukla, 2022; Boo & Choi, 2022; Whasphutthisit & Jitsakul, 2022; Wu & Wang, 2020) 3. Contribution Factors(Charandabi et al., 2022; Chen et al., 2022; Dias et al., 2023; Gutierrez-Osorio & Pedraza, 2020; Kushwaha & Abirami, 2022; Lazar & Jarir, 2022; Lu et al., 2022; Mane & Rathod, 2022; Mapa, 2019; Ning et al., 2022; P & M, 2022; Popoola et al., 2019; Rajkumar et al., 2020; Yassin & Pooja, 2020; Yeole et al., 2023)
	3. Artificial Neural Networks (ANN) (Pachaivannan et al., 2020; Prakash & V, 2022; Radzuan et al., 2020; Yeole et al., 2022, 2023)	3. Causes(Babu & Tamilselvi, 2019; Behura & Behura, 2020; Bokaba et al., 2022; Gutierrez-Osorio & Pedraza, 2020; Parthiban et al., 2022; Sahu et al., 2023; Sundari et al., 2023; Yeole et al., 2023)	
	4. Association Rule (AR)(S et al., 2022)	4. Characteristics(Boo & Choi, 2022)	
	5. AutoRegressive Moving Average with eXogenous (ARMAX)(Borucka et al., 2020)	5. Critical(Pachaivannan et al., 2020)	
	6. Back-Propagation Neural Network(BPNN)(Guo et al., 2022; Wu & Wang, 2020; Xiao et al., 2020)	6. Death(Alrajhi & Kamel, 2019)	
	7. Bayesian Network (BN)(Lu et al., 2022)	7. Economic(M. H. Yuan & Wu, 2022)	
	8. Biological Neural Networks (BNN)(Pachaivannan et al., 2020)	8. Effects(Bokaba et al., 2022)	
	9. Boosting (Joshi et al., 2020)	9. Efficient(N & Punithavalli, 2020; Yeole et al., 2022)	
	10. Categorical Naive Bayes(CNB) (Paul et al., 2020)	10. Frequency(Popoola et al., 2019)(Singh et al., 2020)	
	11. Classification and Regression Trees (CART)(Dia, Faty, Sall, et al., 2022; Jha et al., 2021)	11. Incidence(Paul et al., 2020)	
	12. Convolutional Neural Network (CNN)(Pachaivannan et al., 2020; Shaik et al., 2021)	12. Influence(Chen et al., 2022)	
	13. Decision Tree (DT)(Augustine & Shukla, 2022; Bahiru et al., 2023; Ballamudi, 2019; Budiawan et al., 2022; Chen et al., 2022; Dabhade, 2020; Donchenko et al., 2020; Gutierrez-Osorio & Pedraza, 2020; Jain et al., 2022; Mane & Rathod, 2022;		

Approach	Model	Prediction	Benefit
Borucka et al., 2020;	Mapa, 2019; N & Punithavalli, 2020; Paul et al., 2020; Venkat et al., 2020)	13. Injury(Alrajhi & Kamel, 2019; Ballamudi, 2019; Boo & Choi, 2021; Dabhade, 2020; Radzuan et al., 2020; Shaik et al., 2021)	Sall, et al., 2022; Fiorentini & Losa, 2020; Gupta et al., 2022; Kandasamy et al., 2021; Panda et al., 2023; Sundari et al., 2023; Zhang et al., 2022)
Budiawan et al., 2022;	14. Deep Neural Network (DNN)(Dias et al., 2023; N & Punithavalli, 2020; Pachaivannan et al., 2020; Singh et al., 2020)	14. Location(Alagarsamy et al., 2021; Gupta et al., 2022; Joshi et al., 2020; N & Punithavalli, 2019; Patil et al., 2021)	5. Efficiency Solutions(Alrajhi & Kamel, 2019; Jha et al., 2021; Mane & Rathod, 2022; N & Punithavalli, 2020; Xiao et al., 2020; Yeole et al., 2022; M. H. Yuan & Wu, 2022)
Charandabi et al., 2022;	15. Enhanced Expectation-Maximization (EEM) (Babu & Tamilselvi, 2019)	15. Mockup(S et al., 2022)	
Chen et al., 2022; Cheng et al., 2019;	16. Exponential Equalization (EE)(Gorzelańczyk et al., 2022)	16. Modelling(Venkat et al., 2020)	
Dabhade, 2020; Dia, 2020; Faty, Sarr, et al., 2022;	17. Extra-Trees (ET)(Boo & Choi, 2022)	17. Number(Becker et al., 2020; Behura & Behura, 2020; Borucka et al., 2020; Cheng et al., 2019; Gorzelańczyk et al., 2022; Guo et al., 2022)	6. Future Planning(Begum, 2022; Budiawan et al., 2022; Dias et al., 2023; Fiorentini & Losa, 2020; Mor et al., 2020; Shaik et al., 2021)
Dias et al., 2023;	18. Extreme Gradient Boosting(XGBoost)(Augustine & Shukla, 2022; Boo & Choi, 2022; Donchenko et al., 2020; D. Kim et al., 2021; Mehta et al., 2022; Panda et al., 2023)	18. Patterns(Chen et al., 2022)	7. Hazard(Ballamudi, 2019; Boo & Choi, 2021; Jain et al., 2022; Joshi et al., 2020; Lazar & Jarir, 2022)
Donchenko et al., 2020;	19. Fuzzy Neural Network (FNN)(Zhao et al., 2020)	19. Performance(Whasphut thisit & Jitsakul, 2022)	8. Identification(Ballamudi, 2019; Begum, 2022; Dia, Faty, Sall, et al., 2022; Joshi et al., 2020; Kushwaha & Abirami, 2022; N & Punithavalli, 2019; Rajkumar et al., 2020; Yassin & Pooja, 2020)
Fiorentini & Losa, 2020;	20. Generalized Regression Neural Network (GRNN)(Charandabi et al., 2022)	20. Potential(Augustine & Shukla, 2022)(Mane & Rathod, 2022)	
Gorzelańczyk et al., 2022;	21. Gradient Boosting Machine (GBM)(Panda et al., 2023)	21. Rate(P & M, 2022)(Mor et al., 2020)	
Guo et al., 2022; Gupta et al., 2022;	22. Holt-Winters(Borucka et al., 2020)	22. Risk(Charandabi et al., 2022; Dia, Faty, Sall, et al., 2022; Dias et al., 2023; D. Kim et al., 2021; Ning et al., 2022; Xiao et al., 2020)	9. Number Reduce(Bahiru et al., 2023; Becker et al., 2020; Charandabi et al., 2022; Chen et al., 2022; Cheng et al., 2019; Dabhade, 2020; Guo et al., 2022; Kaliraja et al., 2022; D. Kim et al., 2021; H. Kim et al., 2022; Mehta et al., 2022; Pachaivannan et al., 2020; Parthiban et al., 2022; Patil et al., 2021; S et al., 2022; Sundari et al., 2023; Xiao et al., 2020)
Jain et al., 2022; Jha et al., 2021;	23. K-Means(Yassin & Pooja, 2020)(P & M, 2022)(Patil et al., 2021)	23. Severity(Bahiru et al., 2023; Begum, 2022; Budiawan et al., 2022; Dia, Faty, Sarr, et al., 2022; Donchenko et al., 2020; Fiorentini & Losa, 2020; Gupta et al., 2022; Jain et al., 2022; Kaliraja et al., 2022; Kandasamy et al., 2021; H. Kim et al., 2022; Kushwaha & Abirami, 2022; Lu et al., 2022; Panda et al., 2023; Paul et al., 2020; Rajkumar et al., 2020; Yassin & Pooja, 2020; Zhang et al., 2022)	
Joshi et al., 2020;	24. K-Nearest Neighbours (KNN)(Augustine & Shukla, 2022; Ballamudi, 2019; Bokaba et al., 2022; Dabhade, 2020; Dia, Faty, Sarr, et al., 2022; Fiorentini & Losa, 2020; Jha et al., 2021; Lazar & Jarir, 2022; Mane & Rathod, 2022; Mor et al., 2020; Rajkumar et al., 2020; S et al., 2022; Venkat et al., 2020; M. H. Yuan & Wu, 2022)	24. Status(Mapa, 2019)	
Kaliraja et al., 2022;	25. Linear Discriminant Analysis (LDA)(Jha et al., 2021)	25. Types (Jha et al., 2021; Zhao et al., 2020)	10. Policy(Bokaba et al., 2022; Jha et al., 2021; Mor et al., 2020; Radzuan et al., 2020; M. H. Yuan & Wu, 2022)
Kandasamy et al., 2021; D. Kim et al., 2021; H. Kim et al., 2022;	26. Logistic Regression (LR)(Augustine & Shukla, 2022; Babu & Tamilselvi, 2019; Becker et al., 2020; Bokaba et al., 2022; Boo & Choi, 2021; Dia, Faty, Sarr, et al., 2022; Fiorentini & Losa, 2020; Jha et al., 2021; Lazar & Jarir, 2022; Mane & Rathod, 2022; Mor et al., 2020; Rajkumar et al., 2020; S et al., 2022; Venkat et al., 2020; M. H. Yuan & Wu, 2022)		11. Safety Measures(Cheng et al., 2019; Kaliraja et al., 2022; P & M, 2022; Panda et al., 2023; Parthiban et al., 2022; Patil et al., 2021; Sahu et al., 2023; Singh et al., 2020; Zhao et al., 2020)
Kushwaha & Abirami, 2022; Lazar & Jarir, 2022;	27. Long Short-Term Memory (LSTM)(Alrajhi & Kamel, 2019)		
Lu et al., 2022; Mapa, 2019; Mehta et al., 2022;	28. Multilayer Perceptron (MP)(Paul et al., 2020)		
Mor et al., 2020; N & Punithavalli, 2019; P & M, 2022; Panda et al., 2023;	29. Naïve Bayes (NB)(Bahiru et al., 2023; Ballamudi, 2019; Bokaba et al., 2022; Dabhade, 2020; Dia, Faty, Sarr, et al., 2022; Jha et al., 2021; Lazar & Jarir, 2022; Mane & Rathod, 2022; S et al., 2022)		
Parthiban et al., 2022;	30. Negative Binomial (NB)(Popoola et al., 2019)		
Patil et al., 2021; Paul et al., 2020;	31. Neural Network (NN)(D. Kim et al., 2021; Sundari et al., 2023; Whasphutthisit & Jitsakul, 2022)		
Popoola et al., 2019;	32. Ordered Logistic (OL) (Popoola et al., 2019)		
Prakash & V, 2022;			
Radzuan et al., 2020;			
Rajkumar et al., 2020; S et al., 2022;			
Sahu et al., 2023; Sundari			

Approach	Model	Prediction	Benefit
et al., 2023;	33. Random Forest Classifier (RFC)		12. Trend(Behura & Behura, 2020; Radzuan et al., 2020)
Venkat et al., 2020;	34. Random Tree (RT)(Fiorentini & Losa, 2020)		13. Trouble(Borucka et al., 2020)(Alrajhi & Kamel, 2019)(Paul et al., 2020)(Shaik et al., 2021)(Popoola et al., 2019)
Whasphutthis it & Jitsakul, 2022; Wu & Wang, 2020;	35. Recurrent Neural Network (RNN)(Shaik et al., 2021)		14. Variability Number(Boo & Choi, 2021)(Ning et al., 2022)(Singh et al., 2020)(Gorzelańczyk et al., 2022)
Xiao et al., 2020; Yassin & Pooja, 2020; Yeole et al., 2022;	36. Scale-reduced Attention based on Graph Convolution Network (SA-GCN)(Ning et al., 2022)		
M. H. Yuan & Wu, 2022;	37. Stacked Autoencoder(SAE)(Behura & Behura, 2020)		
Zhang et al., 2022; Zhao et al., 2020)	38. Support Vector Machine (SVM)(Augustine & Shukla, 2022; Bokaba et al., 2022; Kandasamy et al., 2021; Lazar & Jarir, 2022; Mane & Rathod, 2022; Panda et al., 2023)		
	39. Support Vector Regression (SVR)(Wu & Wang, 2020)		
	40. Synthetic Minority Over-sampling Technique(SMOTE)(Gupta et al., 2022)		
	41. Tree Augmented Naïve Bayes (TAN)(H. Kim et al., 2022)		
	42. Zero Inflated Negative Binomial (ZINB)(Popoola et al., 2019)		

The presentation is displayed based on the results of the quotation. The quote approach shows two groups: machine learning and deep learning. Between 2019 and 2023, there will be a significant increase in 2023 with the machine learning approach. The most widely used approaches are machine learning instead of deep learning (Figure 3).

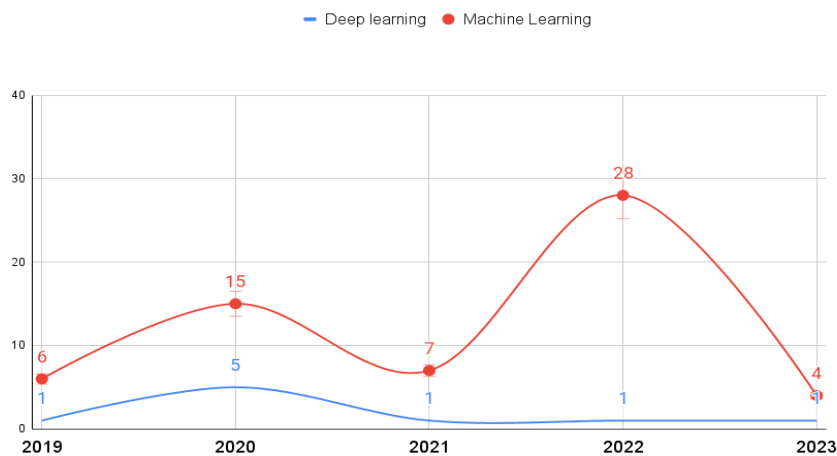


Figure 3. AI in year

The quota model used is 44 models adopted for predicting road accidents. The most used model is random forest, as much as 14.5%, while 29 articles are only used once. Random forest is a popular model used to predict road accidents (Figure 4).

Random Forest is a Machine Learning algorithm used to make predictions in various tasks such as classification and regression. This algorithm is based on ensemble learning, combining several learning models (decision trees) to form a more robust and accurate model. Random Forests are effective in various prediction tasks, but it is important to exercise proper parameter selection and careful model evaluation to achieve optimal performance. Quotation prediction used as many as 26 types of road accident predictions that have been done. Most predictions are as varied as 19 articles

with a machine learning approach, while there are as many as 17 types of predictions that do not exist with a deep learning approach (Figure 5).

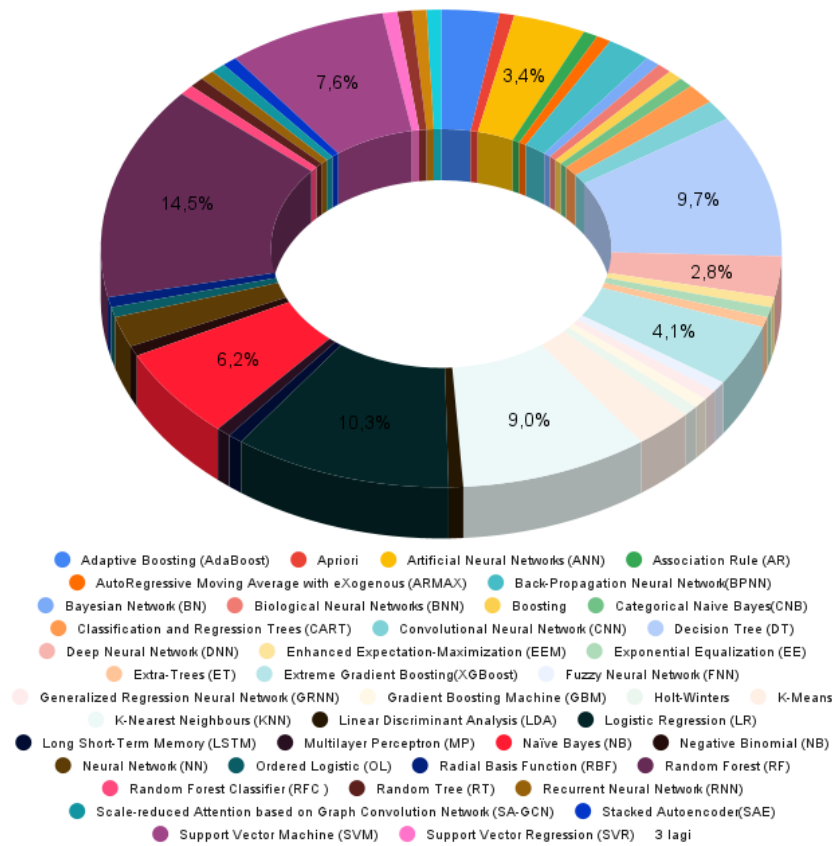


Figure 4. Model prediction using AI

The severity of a road accident refers to the level of impact, including the level of injury or damage caused. It is used to classify accidents into various categories based on the severity of the outcome. The severity of a road accident is usually assessed by considering factors such as the degree of injury suffered by the individuals involved, the extent of property damage, and the possible long-term consequences. Accident severity can be categorized into various levels, often mild to fatal. Determining the severity of a road accident is important for many purposes, such as evaluating the effectiveness of road safety measures, identifying areas of high risk, and informing policies and regulations aimed at reducing accidents and their severity. Accurate assessment of accident severity assists in allocating appropriate resources for emergency response, medical treatment, and rehabilitation of affected individuals. The severity of a road accident can vary significantly based on various factors, including speed, vehicle type, road conditions, driver behavior, and the use of safety measures such as seat belts and airbags. Accurate data collection, analysis, and reporting are critical to understanding trends in accident severity and implementing measures to prevent and reduce road accidents.

Quotation benefits used as many as 14 types of road accident benefits that have been carried out. The most benefits reduce as many as 16 articles with a machine learning approach, while there are as many as five types of benefits that do not exist with a deep learning approach (Figure 6). Number reduction in predicting road accidents refers to efforts to reduce the number of accidents that occur through data analysis and taking appropriate action. This approach is based on data analysis methods to identify risk factors, patterns, and trends related to road accidents and to take preventive measures

to reduce the number of road accidents. Number reduction is an approach that aims to reduce the number of road accidents by using data analysis and appropriate preventive measures. By understanding the risk factors and patterns of accidents and implementing appropriate actions, it is hoped that the number of accidents can be reduced and road safety can be increased.

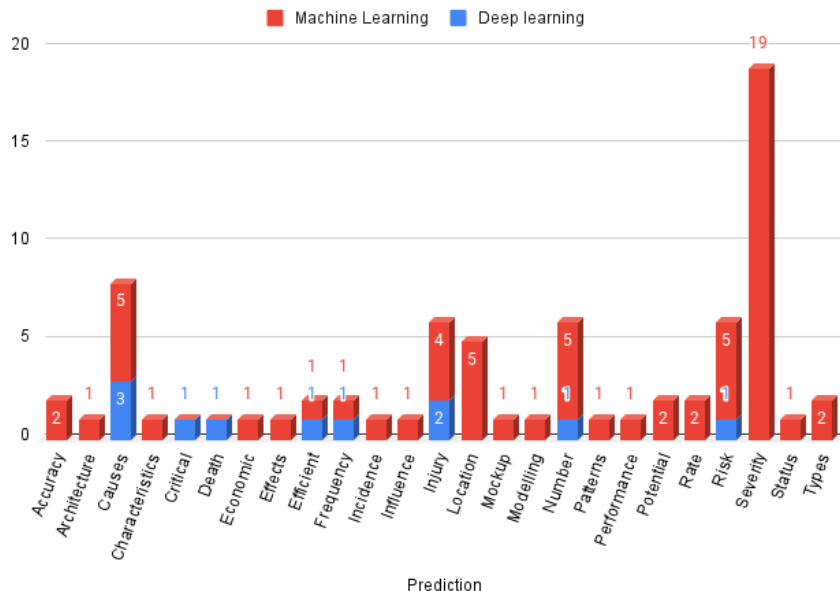


Figure 5. Road accident prediction using AI

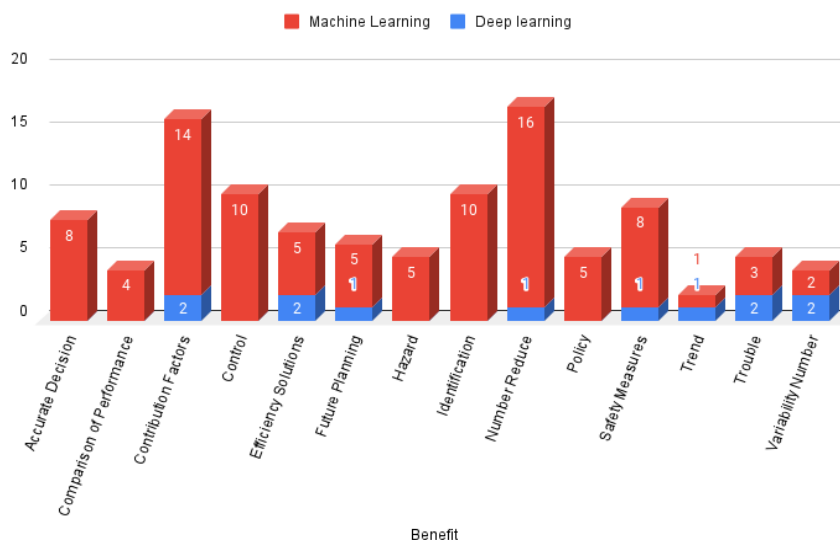


Figure 6. Road accident prediction benefits using AI

The representation is prepared based on the presentation's results about AI's role in predicting road accidents. Road accidents and related factors are the basic things needed to predict accidents as needed. Models and approaches using AI are the main ingredients for making predictions with road accident data and related factors, so strategies and anticipations can be made to overcome them. Strategies and anticipation of road accidents are based on road accident predictions suitable for improving road safety (Figure 7).

AI can play an important role in several aspects of road accident prediction. AI can predict data related to road accidents, such as accident historical data, road conditions, weather, traffic, and other factors.

AI can identify patterns, trends, and risk factors contributing to accidents. The predictions made by AI help in understanding the aspects that influence the occurrence of road accidents. AI can build predictive models to predict future road accidents. Models can consider various factors, such as location, time of day, weather, and road conditions, to predict the probability of an accident in a given area or time. This prediction helps in directing prevention efforts to high-risk areas.

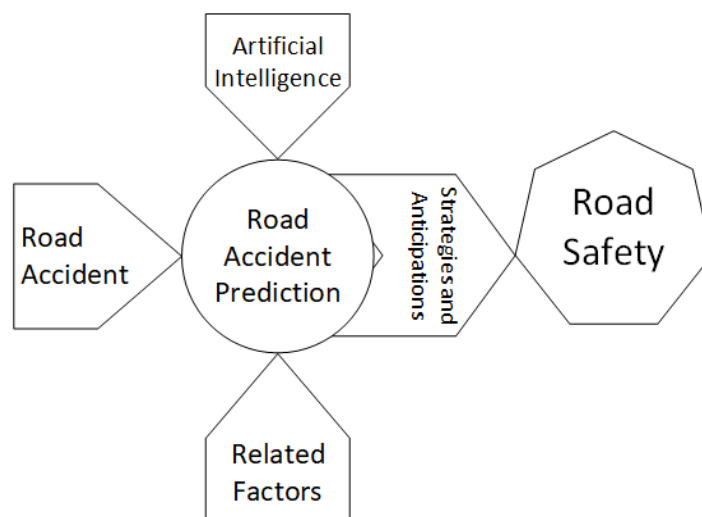


Figure 7. Representation of AI in road accident prediction

AI can help predict risk factors that contribute to road accidents. AI can predict the characteristics of a susceptible driver, environmental factors, road conditions, or the interaction between these factors that impact an accident. This information helps direct prevention efforts to reduce accident risk factors. AI can be used to develop fast and effective accident notification systems. AI uses image and signal processing techniques to predict accidents based on images from traffic cameras or other sensors. This notification system allows for faster emergency response so that assistance can be provided earlier and the impact of an accident can be reduced. AI can optimize traffic management and reduce congestion that can contribute to accidents. Predicting traffic data in real time, AI can identify traffic patterns, predict changes in conditions, and provide recommendations for optimal traffic settings. This helps reduce traffic congestion and improves the smooth movement of vehicles. The representation of the role of AI in predicting road accidents involves data analysis, accident prediction, identification of risk factors, development of accident notification systems, and traffic optimization. Through AI techniques, it is hoped that road accidents can be identified earlier, risk factors can be reduced, and effective preventive measures can be taken to improve road safety.

Road accidents predicted using AI can be explored in more depth in articles that have been published. Astuteness and understanding of AI are very influential when collecting these articles. Quotation is a key process in selecting and sorting the suitability of the articles to be collected. More time, high precision, and understanding between reviewers are the biggest challenges in analyzing the articles used.

CONCLUSION

AI plays a significant role in road accident prediction by collecting and analyzing data, building predictive models, and providing valuable insights. AI can analyze traffic data, weather, road conditions, and other factors potentially influencing accidents. The use of AI in road accident prediction brings great potential to improve road safety, reduce the number of accidents, and optimize emergency response. The results of the presentation can be used as a reference for developing road

accident predictions in terms of approach, model, prediction, and benefits. The results of the representation can be used as an illustration to answer demands for road accident predictions that suit your needs with the aim of improving road safety. Data availability, data suitability, and stakeholder support are challenges in making road accident predictions. Preparation of anticipation and strategies can be carried out with stakeholders to predict improvements in road safety in future work.

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